

Tentative Minutes of the Frequency Hop Ad Hoc Group, July 1994**IEEE 802.11 COMMITTEE
Tuesday, July 12, 1994**

Meeting opened on July 12, 1994 at 0850, with Jim McDonald in the Chair.

Approval of May 1994 meeting Minutes.

Acceptance moved by John McKown, seconded Ed Geiger, carried by acclamation.

Issue items for closing include CCA, Power control, preamble and bit stuffing/scrambling, the Priority Pulse (PrP), as well as PMD issues.

Submissions.

105 - CCA, 159 - text, 160 - scrambler, 161 - Japanese FH pattern, 202 - CRC, 78 - Rx specs, 111 - Spec wording changes, 201 - CCA, 204 - Adjacent Channel Filtering, 205 - Transmit modulation, 206 - unique word, 208 - CCA, 156 - text additions, 132 CCA

CCA Issues

Energy Detect, Bit rate detect, Packet/header recovery, Hybrid systems, Other.

Dean Kawaguchi presented paper 94/105 on FH Carrier Sense proposal; an update to paper 94/70. Lengthy discussion followed, including deferral under various received power level conditions. It was suggested that deferral should only be to like PHYs.

Ed Geiger presented 94/201 on modulation methods, introducing Delay Modulation.

It was stated that the coding gain improvements have not been implemented yet. The use of delay modulation attacks a number of issues, including the bit stuffing/run length/scrambling/DC bias/clock recovery issues. It was felt that the submission appeared unfortunately late in the day, but that several of the issues raised were still on the table for resolution.

Dean Kawaguchi presented paper 94/160, moving to adopt frame synchronous scrambling prior to bias suppression. Seconded Naftali Chayat. Motion is:

Adopt frame synchronous scrambling in the FH PHY packet formatting prior to the bias suppression encoding with polynomial $x^7 + x^4 + 1$, and initialized to all '1's. Moved to table the motion by Brian, no seconder. John McKown calls the question, seconded by Wayne Moyers. Passed unanimously. In favour 9, opposed 3, abstentions 3.

Proposed adjournment until 1300 hours Peter Chadwick, seconded Jerry Loraine.

Meeting resumed at 1310 hours.

Charlie Jenkins presented 94/208 for a "Proposal for FH PHY Based on the Human Model." After much discussion, it was agreed that a large amount of commonality existed between the inputs of Dean Kawaguchi and Charlie.

Larry Zuckerman presented papers 94/132 and 132r. Lengthy discussion: pointed out that if forwarding is needed, the a priori knowledge demanded to implement forwarding requires a similar system.

At this stage, a move was made to obtain a decision on the CCA process and test procedure. Much discussion followed on Diversity and CCA, and the test procedure.

On a straw poll, 4 were in favour of hardwiring the test signal to the equipment, 6 in favour of a radiated field test, and 3 in favour of other methods.

A straw poll on:-

- a) CCA on all antennas
- b) must look at least at the TX antenna
- c) CCA by irradiating the equipment, and requiring CCA decision within a given time

a) in favour	9	against	3	abstaining	2
b)	8		4		2
c)	5		8		1

CCA Detection Time.

With the MAC allowing 32 possible back off slots, if CCA takes 100us, then the total delay can become 3.2ms. Even if the CCA detection time reduces to 20us, this gives a total of 800us. During discussion, it was suggested that the time to

achieve energy detection was about 8us, while to do energy detection and clock recovery will probably take about 13us, during a 1010 bit pattern. For energy and random data detection, some 25us are required for a 0.9 probability of detection. Discussion asked if time bounded services were necessarily possible: Dean Kawaguchi suggested that the PAR requires voice services. However, CCITT latency requirements for voice require about 30ms latency.

Motion: the CCA must be carried out on at least the antenna on which transmission is to be made. Proposed John McKown, seconded Jerry Loraine

Friendly amendment, proposed by Peter Chadwick, to strike the words "at least". Accepted.

Question called by Bill Huhn, Seconded Dean Kawaguchi. In favour 9, Against 6, Abstentions 0.

Motion lost.

Meeting adjourned 1815.

Wednesday July 13th, 1994

Meeting opened at 0845.

Jim McDonald summarized the progress on CCA. Estimates of decision accuracy range from 40 to 80% The group has concluded that CCA should be based on data rate and a minimum level. It was considered that CCA could be done on a 0101 pattern on one antenna in 12 to 15us, and on random data in about 25us. Times for two antenna diversity would be about double.

After discussion, proposed Dean Kawaguchi, seconded Stuart Kerry, that CCA must be evaluated with an antenna that has essentially the same coverage and loss as the transmit antenna.

Question called Jerry Loraine, seconded John McKown

In favour 10 Opposed 2 Abstention 1

Proposed that a statement be taken to the plenary:

"The group in general concludes that a CCA decision is not extremely reliable. estimates of correct CCA decision probability range from 40 to 80%"

Proposed by Jim Renfro to table the motion. Seconded Ron Mahany in favour 9, Against 3 Abstentions 1.

The question of transmitter power and power control was raised in conjunction with CCA and fair access to the media. Several speakers felt that it was not practicable to control the maximum power in the standard, because of the market and regulatory diversities: others felt that power control with respect to safety requirements was desirable. A straw poll suggested that clock derivation was the most welcome form of CCA.

Jerry Loraine suggested that CCA be determined by indicating a clear channel for a 100mw transmitter if over the preceding CCA window of [16us] with a [90%] probability of detection, power level sensed is less than a specified sensitivity [-10dB], or peak signal power detected is less than a specified sensitivity [+30dB] and the signal is not a like FH PHY.

Friendly amendments deleted the words " for a 100mw transmitter"

Moved to call the question Jim Renfro, seconded John McKown. In favour 6, opposed 9, abstention 1.

Dean Kawaguchi proposed to amend to read [90%] probability of detection for preamble, and a [70%] probability for random data. Seconded by Wayne.

Question on acceptance for the amendment called by Jerry Loraine, seconded Jim Renfro. In favour: 14. Against: 2. Abstentions: 2.

Ed Geiger moved to amend to remove the section "or any signal greater than [-50dBm]."

Question called Ed Geiger seconded John McKown

In favour: 13 Opposed: 4 Abstentions: 1

Question called by Ed Geiger, seconded by John McKown, on the motion which reads

"In the presence of any 802.11 compliant FH PHY signal above [-80]dBm, the PHY must signal busy within [16]us at [90]% probability of detection for preamble and a [70]% probability detection for random data. Note: [] = TBD"

In favour 13, Against 3, Abstentions 3.

Straw Polls suggested that an absolute level was accepted, and -85dBm was accepted, with the exception of Jim McDonald who wanted the level related to the transmitted power.

Moved by Dean Kawaguchi that the CCA threshold as defined in the proceeding motions above be -85dBm. Seconded Stuart Kerry.

Question called by Jim Renfro, seconded Jerry Loraine

Question called.

In favour 13 Opposed 0 Abstentions 2

Motion to adjourn Ed Geiger, seconded Wayne Moyers.

Meeting to at reconvene 0800 14 July.

Thursday, July 14th.

Meeting convened at 0815.

Agenda organization decided.

A short discussion followed on CCA timing. It was agreed to table the discussion until the next meeting.

Jim McDonald introduced 94/78, suggesting receiver parameters on IMD and sensitivity. Proposed that further discussion be tabled until after 94/204 by Jerry Loraine.

After discussion, proposed by Jerry Loraine, seconded Dean Kawaguchi, that the receiver sensitivity be -84dBm midband, -82dBm band edge. Friendly amendment to -80dBm, by Jim Renfro, seconded Peter Chadwick. Moved to call the motion Dean Kawaguchi, seconded Jerry Loraine, Unanimous 13,0,0 voting.

MOTION CARRIES

Moved to define that the above figure applies at a 1 in 10^5 BER moved by Dean Kawaguchi, seconded Jim Renfro. Question called by Jerry Loraine, seconded Dean Kawaguchi. Question called, 11 in favour, 2 abstentions.

MOTION CARRIES

2 Mb/s sensitivity has been voted on by the HS group as -75dBm.

Proposed Jerry Loraine, seconded Dean Kawaguchi, that the IM performance in 94/78 be accepted, except the level be -30dB. Question called by Wayne Moyers, seconded Dean Kawaguchi. On the calling of the question, voting, 7 in favour, 1 against, 1 abstention. Voting on the motion: 7 in favour, 2 against, 0 abstentions.

MOTION CARRIES

Proposed Jerry Loraine, that the desense test in 94/78 be accepted, except that at 2MHz, the figure be 30dB, and at 3MHz 40dB, with the desired signal at -3 dB relative to sensitivity. Friendly amendment by Peter Chadwick to amend sensitivity to -80dBm. Accepted. Peter Chadwick raised point of clarification regarding the interfere signal - is it amplitude modulated?
AGREED that the signal is NOT amplitude modulated.
Move to call the question: Peter Chadwick, seconded Jerry Loraine, passed.

Voting on the motion: In favour 7, against 1, abstentions 4.

MOTION CARRIES.

Discussions on transmit - receive - transmit switching times terminated by a call for orders of the day. Requested that the subject be an agenda issue at the next meeting -AGREED by Chairman.

-----ACTION: CHAIRMAN

Ed Geiger introduced various matters in the Editors report.

Dean Kawaguchi introduced various matters derived from 94/103, regarding the CRC and the unique word. Proposed that the CRC be derived from CCITT CRC16.

The transmit state machine and scrambler details were shown, as well as the CCA state machine. Jerry Loraine requested that state machines be noted as illustrative, rather than mandatory: AGREED. Stated that where the text and diagrams disagree, the diagrams have precedence.

Moved Ed Geiger, seconded Wayne Moyers that the document (94/159) be accepted, with the proviso that some figures are TBD.

Question called by: Peter Chadwick seconded: Jim Renfro

Question called unanimously

Voting on the motion: for: 11 against: 1 abstentions: 1

MOTION PASSES.

Agreed to extend the meeting time to 1015

Proposed to enter the contents of 94/156 into 94/68. proposed Dean Kawaguchi, seconded Wayne Moyers. On the motion, accepted 8,0,4.

Proposed Wayne Moyers that the Editor include in the text re plcp provided by Wayne Moyers. Seconded by Mike, friendly amendment to state that this is for rate signalling purposes.

Dean Kawaguchi said that the data had not been presented properly, and moved to table the motion. Seconded Ed Geiger. In favour 5, Against 1, Abstentions, 4.

Naftali Chayat presented 94/206, proposing a better unique word, and moved to adopt 5555 0CBD. Question called Dean Kawaguchi, seconded Wayne Moyers.

Question called. Motion passes 7, 0, 2.

Thanked the Chairman for the work over the meeting.

